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MATHEMATICS
PAPER 2
2½ HRS

BAHATI GILRS HIGH SCHOOL
TRIAL EXAM

INSTRUCTIONS TO CANDIDATES

1. Write your name and Index Number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. The paper contains TWO sections 1 and 11.
4. Answer ALL the questions in Sections 1 and any five in section 11.
5. Answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculation, giving your answers at each stage in the spaces below each question.
7. Non-programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

For Examiner's only
Section 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section 11

17	18	19	20	21	22	23	24	Total

Grand Total [ ]

The paper consists of 5 printed pages.
Candidates should check to see that no page is missing.

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SECTION I (50 MKS)
Answer ALL questions in this section.

1. Use logarithms correct to 4 decimal places to evaluate:- (4mks)

$$\sqrt[4]{\frac{3 \times 1.467^{-2} \times 0.234}{4.25}}$$

2. Find the value of **n** in:- (3mks)

$$\frac{4^n}{10} - 2^n = -1.6$$

3. Determine the inverse, A^{-1} of the matrix

$$A = \begin{pmatrix} 1 & 2 \\ 1 & -1 \end{pmatrix}$$

Hence find the co-ordinates of the point at which the two lines $x + 2y = 7$ and $x - y = 1$ intersect. (4mks)

4. Solve the equation. (3mks)

$$\text{Log}_{10}(6x - 2) - 1 = \text{Log}_{10}(x - 3)$$

5. Find the coordinates of the turning point of the curve whose equation is $y = 6 + 2x - 4x^2$. (3mks)

6. Given that $x = \frac{1}{\sqrt{3}}$ and $y = \sqrt{13}$, express $2\sqrt{3} - 6\sqrt{39}$ in terms of x and y and simplify the answer. (3mks)

7. Find the centre and radius of a circle whose equation is $3x^2 - 24x + 3y^2 + 6y + 3 = 0$. (4mks)

8. **A** varies partly **B** and partly as the square root of **B**. When B=9, A=57 and when B=25, A=145. Find A when B=4. (3mks)

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9. Two trains C and D travelling in opposite directions, on parallel tracks are just beginning to pass one another. Train C is 72m long and is travelling at 108km/h. Train D is 78m long and is travelling at 72km/h. Find the time in seconds the two trains take to completely pass one another. (3mks)

10. a) Expand $(2x-1)^6$ upto the fourth term. (2mks)

    b) Use your expansion to evaluate. $(5.78)^6$ giving your answer to 5 decimal places. (2mks)

11. An industrialist has 450 litres of a chemical which is 70% pure. He mixes with a chemical of the same type but 90% pure so as to obtain a mixture which is 75% pure. Find the amount of the 90% pure chemical used.
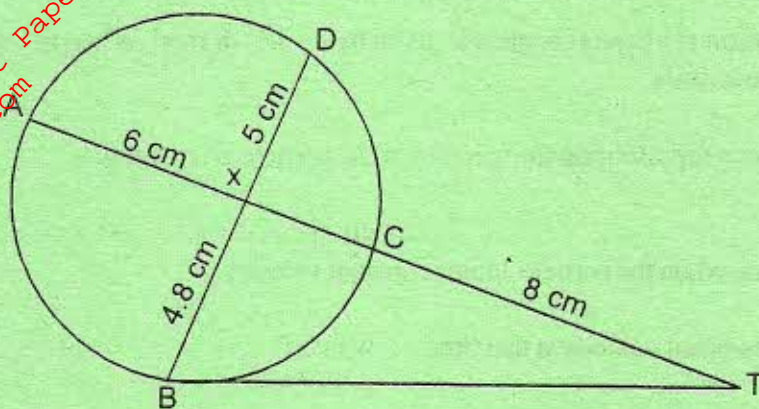
(4mks)

12. Form the three inequalities that satisfy the given region R. (3mks)
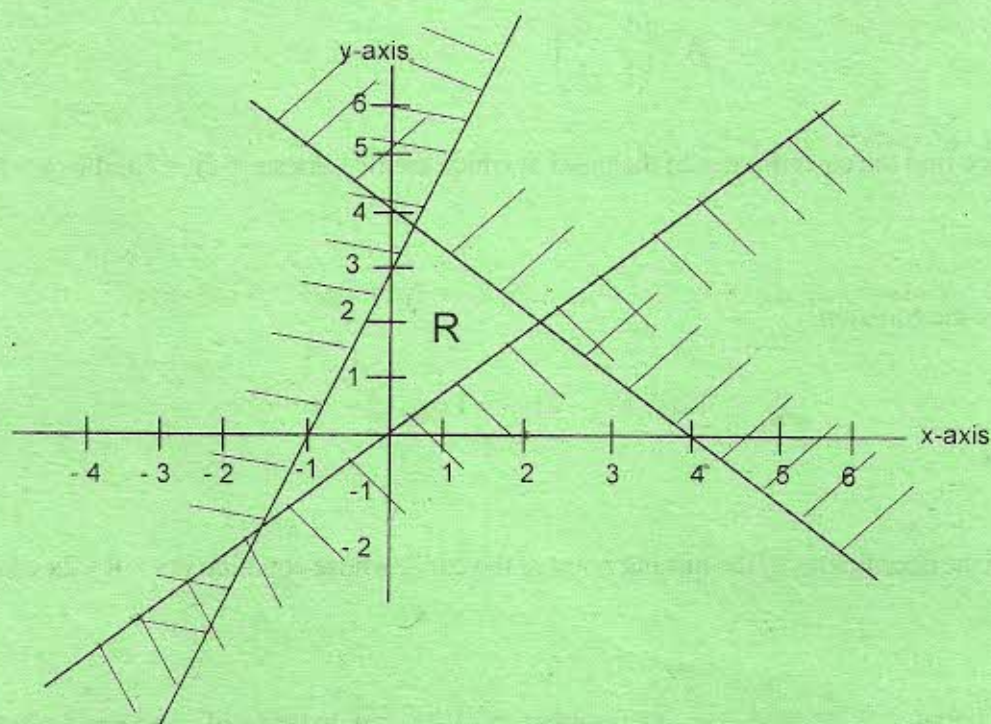
13. Make x the subject of the following formula. (3mks)

$$y=\sqrt{\frac{b-bx^2}{cx^2-a}}$$

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14. In the figure below, BT is a tangent to the circle at B. AXCT and BXD are straight lines.
AX = 6cm, CT=8cm, BX=4.8cm and XD=5cm.

a) Find the length of XC and BT. (4mks)

15. A rectangular card measures 6.2cm long by 2.8cm wide. Find:
a) the absolute error in the area of the card. (1mk)

b) the percentage error of the card. (2mks)

16. Calculate the obtuse angle between the lines $4x + 5y = 8$ and $3x + 3y = 11$. (4mks)

SECTION II (50 MARKS)
Answer **ANY FIVE** questions in this section.

17. The acceleration at a time **t** seconds is given by $a = 3t^2 - 6t$ m/s² When t=1 second, the velocity of the particle is 6m/s.
    Find:
    a) The equation representing the velocity of the particle at any time. (3mks)

    b) (i) The time when the particle attains constant velocity. (2mks)

    (ii) The constant velocity at that time. (2mks)

    c) The distance traveled by the particle between t=2 seconds and t = 6 seconds. (3mks)

18. In a triangle OPQ, R and S are points on PQ and OQ such that PR:RQ = 2:1 and S is the mid-point of OQ. OR and PS intersect at T. Given that $OP = p$ and $OQ = q$, express the following in terms of p and q.

    a) (i) PQ (1 mk)

    (ii) OR (1 mk)

    (iii) PS (1 mk)

    b) If $OT = hOR$ and $PT = kPS$, express OT in two ways, hence find the values of h and k. (5mks)

    c) Determine the ratios:
    (i) $PT : PS$ (1mk)

    (ii) $RT : OT$ (1mk)

19. a) Using the trapezoidal rule, estimate the area under the curve $y = \frac{1}{2}x^2 - 2$, between x=8 and x=2 and x-axis. Use six strips. (5mks)

b) (i) Use integration to evaluate the exact area under the curve. (3mks)

(ii) Find the percentage error in calculating the area using trapezoidal rule. (2mks)

20. The table below gives daily wages of some workers in a certain company.

Wages	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150
Number of workers	10	15	35	42	50	20	20	8

a) How many workers were there in the company? (1mk)

b) Using 105 as assumed mean, calculate:-
(i) the mean daily wage. (4mks)

(ii) the standard deviation (5mks)

21. Box A contains 10 oranges of which 6 are ripe. Box B contains 8 oranges of which 5 are unripe and Box C contains 6 oranges of which 4 are ripe. An orange is taken from each box.
a) Draw a tree diagram to represent the information. (2mks)

b) Calculate the probability that
(i) All the oranges are unripe. (2mks)

(ii) At least one orange is ripe. (2mks)

(iii) At most one orange is ripe. (2mks)

(iv) One orange is ripe and the other two are unripe. (2mks)

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22. a) Draw the graph of $y = 6 + x - x^2$ taking integral values of x in the range $-4 \le x \le 5$. (5mks)

X	-4		-2	-1	0	1	2	3	4	5
Y										

b) Use your graph to solve the following quadratic equations.

(i) $6 + x - x^2 = 0$ (1mk)

(ii) $6 - x - x^2 = 0$ (3mks)

c) From the graph find the values of x which satisfy the simultaneous equations. (1mk)

$$y = 6 + x - x^2$$

$$y = 2 - 2x$$

23. a) A commercial plot is valued at Ksh. 2,000,000. Due to high rate of crime in the area, the value of the plot depreciated at the rate of 10% per six months for 2 years. It then appreciated at the rate of 4% quarter year for the next 3 years. What was the value of the plot after 5 years. (5mks)

b) A commercial agency bought a plot for Ksh.300,000 per hectare. The value of this plot appreciated at the rate of 10% p.a. After two years, the Agency sold the plot to a customer who paid Kshs. 500,000 per hectare. In the transaction, the Agency received Ksh. 275,000 more than the present value of the plot. Determine the size of plot that the commercial agency sold in hectares. (5mks)

24. A company makes brands A and B of breakfast cereal both of which are enriched with vitamins P and Q. The necessary information about these cereals is given by the table below.

	Cereal		Minimum Daily Requirement
	A	B	
Vitamin P (unit / gram)	1	2	100
Vitamin Q (Unit / gram)	5	3	300
Cost / gram	Sh. 20	Sh. 30	

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a) Form all inequality to represent this information. (3mks)

b) Draw the inequality on the graphs showing the region which satisfy the inequalities. (3mks)

c) From your graph determine the minimum daily requirements of vitamins **P** and **Q** at the lowest cost. (2mks)

d) Determine the lowest cost. (2mks)